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EDITORIAL

Shifting Practices in Digital Workplace Learning: An Integrated Approach to Learning, Knowledge Management, and Knowledge Sharing

No one can dispute the impact that technology innovation, especially the rapid development of information technology (IT), has on our work and life. It has not only created performance improvement opportunities for individuals and organizations (Purcell & Rainie, 2014) but also challenged Human Resource Development (HRD) professionals to critically examine the applications of IT and determine their unitizations in the areas of learning, performance enhancement and organizational development (Benson, Johnson, & Kuchinke, 2002; Leonardi, 2013). As importantly, increased technology innovation provides an impetus for HRD professionals to investigate concomitant changes in the social/work environment of the digital workplace in order to understand their impact on employees' learning behaviors, to develop innovative HRD solutions that will fit and support the new socio-technical relationships in organizational systems, and to move beyond a linearity metaphor and think instead in terms of simultaneity in the design of learning and development interventions (Li, 2016).

Innovation is no stranger to the field of HRD, especially in the area of training and development. Many forms of innovative interventions have been introduced over the decades. These have been aimed at improving the effectiveness and the efficiency of learning and training delivery, and include process-oriented approaches (i.e. instructional design processes and performance improvement systems), training delivery technologies (i.e. educational CD-ROMs, eLearning, game based learning, and MOOC platforms), and incorporating equipment and products (e.g. overhead projector, audio/visual equipment, personal computer, PDA, tablet and smart phones). Innovation has taken place to create new material products or production processes, and more importantly, to shape new skills and capabilities that allow us to do things that could not be done before and do them in a better or more effective way. As a result, innovation shifts the collective awareness, knowledge and actions of the individuals and organization in practical settings (Lanzara, 2016); a new set of socio-technical processes, entailing new norms and behaviors, is established in the workplace powered by digital technology.

Digital technology is an all-encompassing term that includes methods, systems, devices and knowledge that use digital and computerized methods to transmit data and deliver information. The advancement of digital technology has been driving the changes in the workplace, learning process included. Digital workplace learning can be simply defined as learning supported by digital technology for the purpose of enhancing learning and job performance. Through the affordance of a wide range of tools and equipment, digital technology has allowed learners to personalize their learning space, to gain extended access to learning opportunities, to enhance individual and group

learning experiences by participating in learning communities, and to gain just-in-time performance support through knowledge sharing in real time. As a result, workplace learning has been experiencing transformative change. Aspects of these changes are aligned with what we know about learners' needs and preferences. For example, learners prefer learning that happens "just in time "to allow them to take immediate action to do something rather than learning that requires going through a linear curriculum or subject-based approach (Gilmore 2010). To embrace this transformation, we advance a proposition that simultaneity will be the new reality for HRD interventions in the digital workplace.

Simultaneity expects us to integrate and converge information and ideas to resolve skill discrepancies, provide performance enhancement, and inform decision-making in the context of work and in real-time. To illustrate the proposition, we share a preliminary conceptual framework that we have designed that employs an application-oriented approach by facilitating a continuous learning process through induced double loop learning within a work community. It is our belief that this approach will benefit individual employees as well as the work community as a whole. The parameter of the work community is defined by the user/sponsor, and can be a project team, a department, a military unit on a mission, or an organization.

The framework we are proposing is built on three basic assumptions. First, people have different learning preferences and if an individual's learning preference is accommodated, this learner can achieve better learning outcome. This assumption is supported by many of the learning style researchers, for examples, Kolb (1984), Dunn and colleagues (1995), Felder and Silverman (1998), and Fleming (2001). While there are differences in opinions regarding whether a person's learning preference is a relatively fixed disposition or modifiable personal characteristic, there is consensus that a person's learning style/preference has an impact on his or her learning performance. Hence if a person can design his or her own learning space according to his or her learning preference for receiving and processing information, it is more likely that this person will be more motived to participate in the learning process, and thus achieve better learning outcomes.

The second assumption upon which our framework is based is that learning plays an important role in enabling both individual and organizations to be innovative and agile in achieving organizational performance goals (Brown and Eisenhard, 1995). Learning is an individual pursuit and an organizational gain where a firm develops new knowledge and insights from shared individual experiences to shape organizational learning. While there are differences between individual learning and organization learning, the latter is the generation of individual knowledge in a way that impacts behavior on a wider scale (Huber, 1991). To create an organizational learning culture, a firm needs to establish structures, processes, and strategies to enhance learning behaviors at the individual, team and organization levels (Hurley and Hult, 1998; Marsick and Watkins, 2003).

Organization learning is often depicted as requiring a four-steps approach. The first step is to acquire knowledge through obtaining new information. The second step is to distribute and share the information and knowledge among employees within the firm. The third step is knowledge comprehension where employees make sense of the information and transform it into new knowledge. The fourth step is to institutionalize the new

knowledge in organizational memory for future use. An organization that learns stands a better chance to sense new trends and understand new challenges, and hence is capable of coming up with faster responses and more appropriate actions (Jimenez-Jimenez and Sanz-Valle, 2011). Indeed, many studies have made the connections between organizational learning and firm performance (i.e. Marsick and Watkins, 2003).

Argyris and Schon (1996) have long argued the importance of double-loop learning in organizations. Single loop learning is the learning process that enables the organization to function within the scope of existing policy and routines. Organizations and employees are quite good at single loop learning because they can evaluate their learning or behavior outcomes against a set of predetermined learning objectives or performance standards. Double loop learning, on the other hand, demand the capability to question existing policy, routines and assumptions for the purpose of creating new ones. It transcends current thinking and shifts current practices to allow organizations to be innovative and proactive. Double loop learning can be enhanced through reducing learning impediments such as bounded rationality, system complexity, and information delays (Sterman, 1994). In a study of public managers, Kim, MacDonald and Andersen (2013) were able to find through a simulation study that double loop learning was able to help the managers extend and develop new policy options through the recognition of the limitations set by the boundaries of their shared mental model as a management team.

Digital technology has the potential to make available quality information at the user's fingertips in the workplace and in real time. It can also extend information access by introducing additional resources beyond the organizational boundaries while simplifying employees' access to knowledge content through a personalized learning space. In a study of using tablets to assist medical consultation, Reychav and colleagues (2016) found that when under the guidance of the doctors, patients were able to better formulate knowledge by reading more relevant and reliable information in order to engage in mutual decision-making. This has resulted in an increase in patient satisfaction. Hence, the quality of information matters in double loop learning. Therefore, the third assumption of our framework is that the higher the quality of the information, the better the quality of learning. The relationships of these three assumptions are shown in Figure 1. High quality information combined with timely accessibility for the learner in

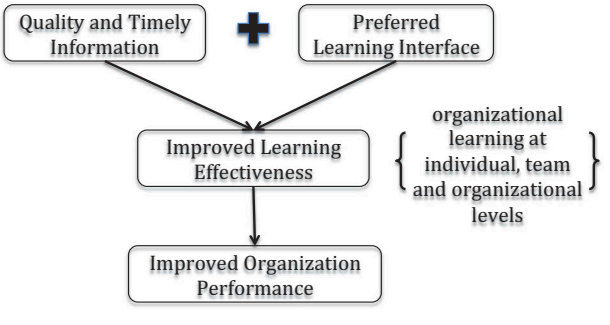

Figure 1. The relationship between quality information, learner preference, and effective learning and organization outcomes

his or her preferred learning style will increase the quality of learning of the individual, the team and the organization, which in turn, will contribute to organizational innovation and performance.

Given these assumptions, we sought to develop a conceptual framework for an application-oriented approach that will ensure the necessary preconditions are met so it can cultivate effective organizational learning through individual, team and organizational- level learning activities. In the following sections, we discuss each of the three processes involved in the conceptual framework, which we have named the Application Facilitated Self-Directed Learning Process, or AFiSD: the capture and sharing of high quality information, design of the learner preferred learning interface, and technology-supported metacognitive skill development.

The capture and sharing of high quality information

Knowledge management is a widely discussed topic among scholars and practitioners, and generally consists of three sub processes: knowledge capture and creation, knowledge sharing and distribution, and knowledge acquisition and application. Knowledge can be classified into two main types, tacit and explicit knowledge. Tacit knowledge is developed directly from experience, usually shared through conversation and can be difficult to codify. Explicit knowledge can be precisely articulated and communicated in text, diagrams and other materials (Nonaka and Takeuchi, 1995, as cited in Li and et al., 2009). Supported by digital technology, explicit knowledge can be quickly converted into electronic format, useful for the knowledge management in which many organizations today are actively engaged. Generally, organization driven knowledge management can be categorized into two approaches, the codification approach and the personalization approach (Hansen et al, 1999). The codification approach encourages codification of organizational knowledge, preferably in electronic-based repositories where members of the organization can access. The personalization approach is based on the belief that organizational knowledge is developed and embedded with organizational members, thus requiring organizations to encourage person to person contact either physically or through the use of IT. It is common for organizations to utilize both codification and personalization strategies for knowledge management, and these are therefore incorporated in our framework.

Information technology has the capability to assist in both codification and personalization processes of organizational knowledge management. Employees can input and make accessable their specific knowledge such as job processes, checklists, and formal or informal work procedures through a variety of methods including blogs and wikis to share their stories and narratives. With the development of AI technologies, machine learning and deep learning algorithms have increased the quality of data mining. Using a data analytic system supported by deep learning, the machine can improve on the quality of information by encouraging learning through self-teaching. This learning can occur through user feedback, such as rejections, and get better every time when there is an interaction between the learner and the system. As the analytical capability of machine learning and deep learning continue to improve, we will be able to include audio and video information into this smart knowledge management process and depend on it to select and provide even more meaningful and more relevant

content to the user in a timely manner. Instead of having a knowledge management system that collects static data, the knowledge management system in our framework will be a smart system that is capable of capturing cognitive dissonance using advanced technologies and use this cognitive dissonance to guide the learner through the learning or problem solving process. Along the way, all incidents of learning and relevant information will be captured, processed, organized, and shared according to the learner's preference. As seen in Figure 2, this part of the process is denoted as a smart knowledge management process. The system gets smarter as more data are collected. By applying machine learning and deep learning theories, it will be able to improve the relevancy and accuracy of the knowledge and information outputs to support future learning, problem solving, and decision-making.

The design of the user-preferred learning interface

As noted earlier, learners often have a preferred way of receiving information. Using VARK model as an example, Fleming (2001) proposed a four dimensional learning style inventory. The four learning style dimensions in this model are visual, aural, read/write, and kinesthetic, and learning style preferences are determined by a person's sensory modality preferences. A student may prefer one or more styles to the other styles when accessing information. The student can design her own learning space by interacting with the system, for example by answering questions or submitting requests. All the information from these interactions will be collected and entered into the smart knowledge management process and used by a data analytic algorithm to classify the learner's preferred learning style, interests, learning goals, and other relevant learning parameters. In addition, the learner can also access information and learn from her communities of practice, and other favorite external resources. All the information this learner accessed during the entire learning process will be recorded and codified in the knowledge management system as supported by machine learning and deep learning algorithms, thereby allowing the system to develop a better understanding of the learner's needs and preferences over time, and to thus increase the quality of learning support over time as well. The intention is to integrate the learning process with the knowledge management process in order to heighten the quality of knowledge sharing among the community to accomplish the purpose of supporting simultaneous learning and performance enhancement at the workplace.

Each user can download the application on his/her tablet, smart phone or a computer, and then customize the user interface according to her own learning and developmental needs, selecting learning mode preferences, joining learning groups or communities, selecting subjects of interests, and designing her own learning and knowledge space. The system affords the learner the ability to acquire information and engage in learning through multiple formats: text, audio, video, graphics, pictures, and interaction between users through chat rooms, text messages, and interactive videos, in order to create a shared learning space among a unit (e.g. team, department, company, etc). Again, as the analytical capability of machine learning and deep learning improves, the smart knowledge management process will be able to process these additional sources of information into its database of knowledge management system and learners can gain access to learning resources at any time. Of course, for

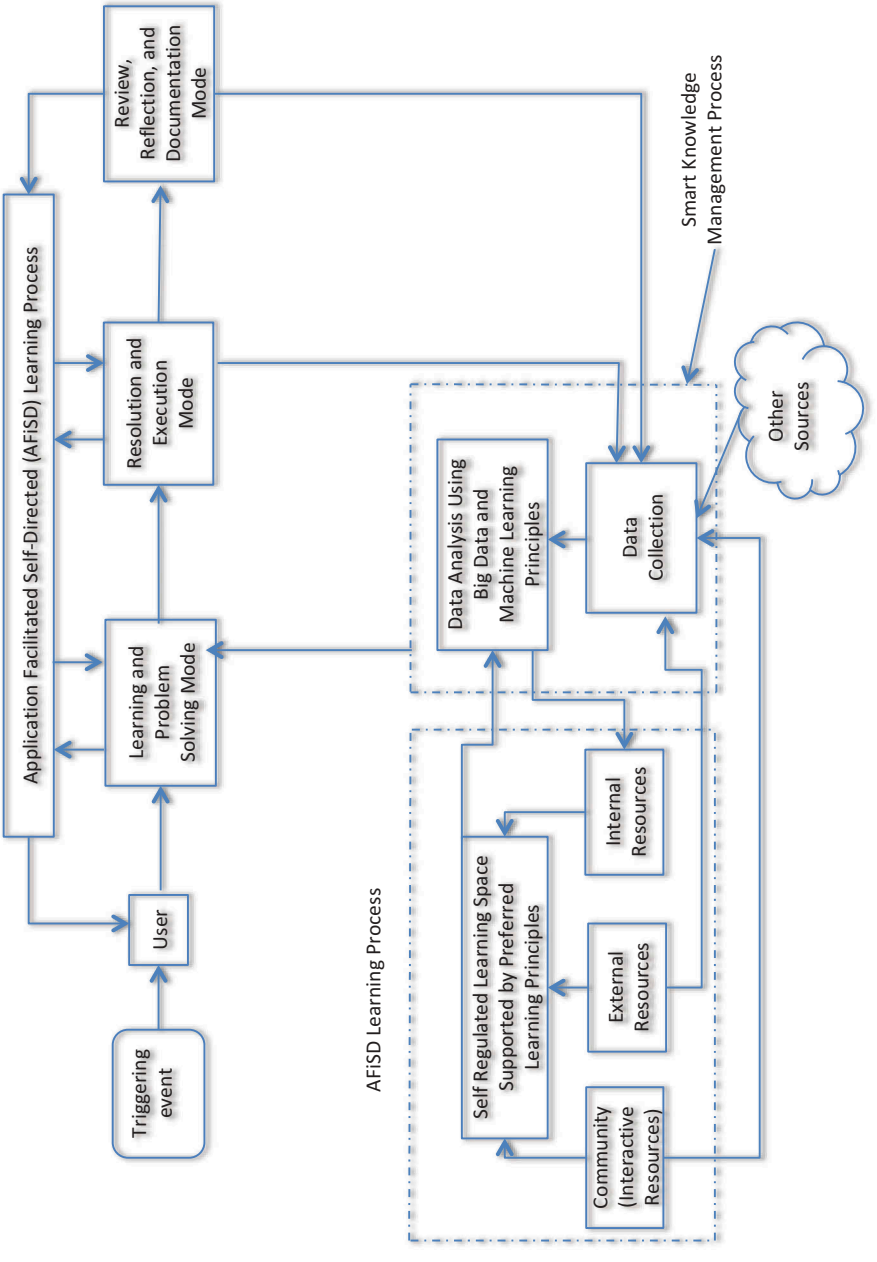

Figure 2. Conceptual framework of an application approach toward the integration of learning, knowledge management and knowledge sharing ©

information security reasons, the learner will also have a choice to select or assign security levels to meet the needs of company classification and the classification of the information.

Technology-supported metacognitive skill development

Metacognition refers to the knowledge about, and regulation of, one's cognitive activities in the learning process. Evidence has shown that metacognitive skills contribute to leaning performance and can be measured as a reasonable predictor of learning outcomes in both traditional and online learning environments (Veenman et al. 2006). Discrepancies in learners' metacognitive skills can be the result of one of two reasons: a learner might not have sufficient metacognitive knowledge and skills at their disposal, or second, a learner has a certain level of metacognitive knowledge and skills but fails to use them due to task difficulty, test anxiety, lack of motivation, or their inability to make judgments about when to apply their metacognitive skills. Hence, to teach someone metacognition is not a easy task; one needs to tailor the instruction to the context of the learner's individual circumstances, model the behavior and provide timely feedback. In reality, many instructors lack sufficient knowledge about metacognition and lack sufficient metacognitive skills themselves to enhance these skills in their students (Veenman et al. 2006).

Instead of lecturing and teaching metacognitive skills, we operationalize and embed them in the design of the learner application. Learners are led to follow and practice important metacognitive skills while using the application, such as think about their cognitive processes, learn how to use resource effectively, process information at a deep level, and monitor their own performance accurately. A learner can use the application to self-regulate her own learning and reflection, and organize what she has learned from different sources and contribute to the knowledge accumulation for personal use, and/or share with the system and the community of learners. By being actively involved in the learning process, learners interact with other learners, experts, instructors/supervisors, and others in their communities of practice. During this process, learners learn how to co-regulate with others together as a whole and among a community. A computerized process that can provide support in a self-directed manner to leader learners through the monitoring, evaluating and regulating processes contributes to the creation of a shared metacognition (Garrison and Akyol, 2015). In addition, other learning principles, such as experiential learning, problem-based learning, critical thinking, and action learning can also be integrated in the design.

Learning often occurs when there is a triggering event that prompts the user to learn in order to achieve predetermined learning objectives or to resolve a mismatch of skills or knowledge. Following the conceptual framework, this user becomes a learner and engages in the AFiSD learning process, and subsequently engages with a self-regulated learning space and smart knowledge management system. Afterwards, the user will move to execution mode where the user will take actions to resolve the problem and close the learning gap. Then, the user will move into the review, reflection, and documentation mode to complete the learning process as well as contribute their learning to the smart knowledge management system. The system will provide key checklist items to lead the learner/user through important critical thinking steps, and this reflection will subsequently be part of the adaptive learning and add to the database to benefit future users of the system.

We are still in the early stages of the development of this learning framework. However, we do believe that the conceptual approach presented herein addresses critical needs for continuous and adaptive learning faced by the learning organization. Significant work yet to be conducted will strengthen the conceptualization and application capability of the proposed framework. Much future research, design and development is needed to ascertain the individual motivational and contextual factors affecting learners' use of the proposed application, and situations where the application is most needed. We hope this framework will serve to advance the discussion and understanding of how IT may impact the way we design learning, support performance, and lead organizational change.

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